Examiner's Amendment

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

2. Authorization for this examiner's amendment was given in a telephone interview with Associate **Attorney Robert M Sieg Reg. No. 54,556, and Attorney Thomas E. Kocovski Jr. Reg. No. 28,383** on November 21, 2008 along with authorization to charge any necessary fees to applicant's deposit account.

3. The application has been amended as follows:

A) Cancel claim 1.

B) Replace claims 2-10 of the claims from the **April 23, 2007 listing of claims** with the following **Examiner amended claims 2-10**:

Claim 2 **---**The system as claimed in **claim 13**, wherein the data module for combining first and second k-space data are configured to substitute the first k-space data for part of the second k-space data to form a full k-space. **---**

Claim 3 **---**The system as claimed in **claim 13**, wherein the data module for combining first and second k-space data are configured to add the first k-space data to the second k-space data to form a full k-space. **---**

Claim 4 **---**The system as claimed in **claim 13**, wherein the acquisition module for acquiring first magnetic resonance signals are configured to acquire signals from protons. **---**

Claim 5 ---The system as claimed in **claim 4**, wherein the acquisition module for acquiring first magnetic resonance signals are configured to acquire signals from protons in another substance than H_2O. ---

Claim 6 ---The system as claimed in **claim 13**, wherein the acquisition module for acquiring first magnetic resonance signals are configured to acquire signals from non-proton nuclei. ---

Claim 7 ---The system as claimed in **claim 6**, wherein the acquisition module for acquiring first magnetic resonance signals are configured to acquire signals from hyperpolarized non-proton nuclei. ---

Claim 8 ---The system as claimed in **claim 13**, wherein the acquisition module for acquiring first magnetic resonance signals are configured to acquire signals from electron spins. ---

Claim 9 ---The system as claimed in **claim 13**, wherein the acquisition module for acquiring second magnetic resonance signals are configured to acquire signals from protons. ---

Claim 10 ---The system as claimed in **claim 9**, wherein the acquisition module for acquiring second magnetic resonance signals are configured to acquire signals from protons in H_2O. ---

C) Cancel claim 11.

D) Replace claims 12-16 of the claims from the **April 23, 2007 listing of claims** with the following **Examiner amended claims 12-16**:

Claim 12 --- A carrier or memory storing a computer program executable by a computer to perform a method comprising:

acquiring first magnetic resonance signals for a central portion of k-space **from a first nuclear or electron species** using a first magnetic resonance frequency;

acquiring second magnetic resonance signals for a peripheral portion of k-space **from a second nuclear species different from the first nuclear or electron species** using a second magnetic resonance frequency different from the first magnetic resonance frequency;

combining the first k-space data corresponding to the first magnetic resonance signals and the second k-space data corresponding to the second magnetic resonance signals to form a full k-space; and

generating an image by transformation of the full k-space to image space.

Claim 13 --- A magnetic resonance imaging system comprising:

an acquisition module **configured for acquiring** first magnetic resonance signals **in a central portion of k space** from a first nuclear **or electron species using a first magnetic resonance frequency** and **configure for acquiring** second magnetic resonance signals **in a peripheral portion of k space** from a second nuclear **or electron** species different from the first nuclear **or electron** species **using a second magnetic resonance frequency different from the first magnetic resonance frequency;**

a data module configured for combining first k-space data corresponding to the first magnetic resonance signals and second k-space data corresponding to the second magnetic resonance signals in order to form a full k-space; and

an image module configured for generating an image by transformation of the full k space into image space. ---

Claim 14 **---** The system as claimed in **claim 13**, wherein the acquisition module is configured to acquire the first magnetic resonance signals from a first nuclear species other than the 1H nuclear species and to acquire the second magnetic resonance signals from the 1H nuclear species.

Claim 15 **---** The system as claimed in **claim 13**, wherein the acquisition module is configured to acquire the first magnetic resonance signals from electron spins and to acquire the second magnetic resonance signals from the 1H nuclear species.

Claim 16 **--- A** magnetic resonance imaging method **comprising**:

acquiring first magnetic resonance signals **for a central portion of k space** from a first nuclear **or electron species using a first magnetic resonance frequency**;

acquiring second magnetic resonance signals **for a peripheral portion of k-space** from a second nuclear **or electron** species different from the first nuclear **or electron species using a second magnetic resonance frequency different from the first magnetic resonance frequency**;

combining the first k-space data corresponding to the first magnetic resonance signals and the second k-space data corresponding to the second magnetic resonance signals to form a full k-space; and

generating an image by transformation of the full k-space to image space.

Claim 17 **---** The magnetic resonance imaging method as claimed in **claim 16**, wherein the first magnetic resonance signals are from a nuclear species other than the 1H nuclear species, and the second magnetic resonance signals are from the 1H nuclear species.

Claim 18 **---** The magnetic resonance imaging method as claimed in **claim 16**, wherein the first magnetic resonance signals are from electron spins and the second magnetic resonance signals are from the 1H nuclear species. **---**

E) **Replace the title** with the following **Examiner amended title**:

--- System and Method for MRI using MR signals from Different Resonant Species in different regions of k-space ---

The following is an examiner's statement of **Reasons for Allowance:**

4. With respect to **Examiner amended independent claims 12, 13** and **16**: These claims are considered to be allowable over the prior art of record because the prior art of record neither discloses nor suggests an MRI system/method or the corresponding carrier or memory stored computer program executable by a computer to perform another corresponding MRI k-space data acquisition method comprising the acquisition of k-space data in a central portion of k-space being acquired from a first nuclear species at a first magnetic resonance frequency, and an outer or peripheral portion of k-space being acquired from a second nuclear or electron species different from the first nuclear or electron species using a second magnetic resonance frequency different from the first magnetic resonance frequency in combination with the remaining limitations of each of the claims, setting for the how the acquired data is combined is not taught or suggested by the prior art or record. It is the entire combination of the claim limitations taken as a whole that constitutes both the novelty and non-obviousness of applicant's claims.

5. However, the examiner notes that it is the entire combination of all of the claim limitations taken as a whole that constitutes both the novelty and non-obviousness of applicant's claims.

6. With respect to **dependent claims 2, 4-8, 10-11, 13-16,** and **Examiner amended dependent claim 18,** each of these claims is considered to be allowable by

the Examiner because they each depend from an allowable amended independent claim.

7. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Examiners comment

Priority

8. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Response to Arguments

9. Applicant's arguments filed in the appeal brief of March 3, 2008 are considered to be moot in view of examiners amendment made herein, which resolves the issues and objections raised by the Examiner in the last office action.

Prior Art made of Record

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

A) **Duerk et al.,** US patent application publication 2005/0017717 A1 published Jan. 27th 2005, filed march 22nd 2004, with an effective US priority date from 60/456,333 of March 20th 2003.

B) **Duerk et al.,** US patent **6,995,560 B2** issued February 7th 2006 which corresponds to **Duerk et al.,** US patent application publication 2005/0017717 A1 published Jan. 27th 2005, that was also filed March 22nd 2004, with an effective US priority date from 60/456,333 of March 20th 2003.

C) **Moriguchi et al.,** US patent application publication 2005/0033153 A1 published Feb. 10th 2005, filed April 26th 2004, with an effective US priority date from 60/465,551 of April 25th 2003.

D) **Mugler III et al.,** US patent application publication 2005/0174114 A1 published Aug. 11th 2005, with an effective US priority date from 60/380,760 of May 15th 2002.

E) **Mugler III et al.,** US patent **7,034,533 B2** issued April 25th 2006 which corresponds to **Mugler III et al.,** US patent application publication 2005/0174114 A1 published Aug. 11th 2005, with an effective US priority date from 60/380,760 of May 15th 2002.

F) **Lai** US patent 6,225,804 B1 issued May 1st 2001.

G) **Rzedzian** US patent 4,767,991 issued August 30th 1988.

H) **Van Den Brink** US patent Application Publication 2005/0279282 A1 published December 14th 2006, filed October 1st 2004 with a EP priority date of Oct. 13th 2003. The examiner notes that this is the publication of applicant's instant application, which is noted for purposes of a complete record only. It is not applicable as prior art.

I) **Meyer et al.,** US patent 5,485,086 issued January 16th 1996.

J) **Meyer et al.,** US patent 5,539,313 issued July 23rd 1996.

K) **Schomberg** US patent 5,604,434 issued Feb. 18th 1997.

L) **Dale** US patent 7,078,899 B2 issued July 18th 2006, filed May 17th 2004, with an effective US priority date of May 15th 2003.

M) **Moriguchi et al.,** US patent **7,042,215 B2** issued May 9th 2006 filed April 24th 2004, with an effective US priority date from provisional application 60/465,551 of **April 25th 2003**.

N) **Salerno et al**., US patent application publication **2004/0260173 A1** published December 23, 2004, with an effective US priority date of April 13th 2001.

O) **Haase et al.,** US patent **6,400151 B1** issued June 4th 2002 filed January 13th 2000,

P) **Van Den Brink et al.,** US patent **6,593,740 B1** issued July 15th 2003, filed May 17th 2000.

Conclusion

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tiffany Fetzner whose telephone number is: (571) 272-2241. The examiner can normally be reached on Monday-Thursday from 7:00am to 4:30pm., and on alternate Friday's from 7:00am to 3:30pm.

12. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diego Gutierrez, can be reached at (571) 272-2245. The **only official fax phone number** for the organization where this application or proceeding is assigned is **(571) 273-8300**.

13. Information regarding the status of an application may be obtained from the Patent Application information Retrieval (PAIR) system Status information for published applications may be obtained from either Private PMR or Public PMR. Status information for unpublished applications is available through Private PMR only. For more information about the PMR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PMR system contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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December 2, 2008
Technology Center 2800

/Brij B. Shrivastav/
Primary Examiner
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